2018 Ecological Monitoring Summary

Founded in 2001, the ***rare* Charitable Research Reserve** is a community-driven urban land trust, nature reserve and environmental institute with its headquarters and first three locations comprising over 900 acres in Waterloo Region, Ontario within the Haldimand Tract that spans six miles on either side of the Grand River. In 2006, ***rare*** joined Environment Canada's Ecological Monitoring and Assessment Network (EMAN) to establish long-term ecological monitoring programs for the property with the objective of determining the status of ***rare's*** ecosystems and tracking how they change over time. Since 2006, several ongoing monitoring programs have been established at ***rare*** and have been carried out in subsequent years. In 2018, ecological monitoring programs occurred for butterflies, plethodontid salamanders, and soil humus decay rates (and see separate report for a summary on Vegetation Sampling Protocol). The following is a summary of highlights from 2018 monitoring programs.

Butterfly Monitoring

Butterfly monitoring occurs at ***rare*** across four separate transects for fourteen weeks during the late spring and summer. In 2018, a total of 56 different species and 6627 individual butterflies were observed during monitoring. Observed abundances in 2018 were the highest ever recorded during butterfly monitoring at ***rare***, passing the previous high of 5820 in 2012. Several noteworthy observations from the 2018 monitoring season are included below.

Spicebush Swallowtail was observed on the property for the first time, and was observed both in monitoring and by citizen scientist Julie Reid. This is a significant finding, as ***rare*** falls towards the edge of the historical range of the species, which is very rarely seen in the Waterloo Region. American Snout was observed for the second consecutive year, a rare migrant to the region which had not been seen since 2012 prior to its observation in last year's monitoring program. Mulberry Wing skipper was also observed for the second consecutive year, after being recorded for the first time in monitoring in 2017.

The most commonly observed species was the Clouded Sulphur, which made up for 22.5% of all observations. The Cabbage White was the second most abundant species, accounting for 13.4% of all observations. Monarch observations continue to increase relative to the previous four monitoring seasons with a total of 288 observed in 2018, up from 150 in 2017.

All of ***rare's*** historic butterfly monitoring data was integrated to PollardBase in 2018. This will make future and historic data easier to track, analyze, and share with similar research programs. During the 2018 Annual Butterfly Count, 623 individuals from 37 species were observed.

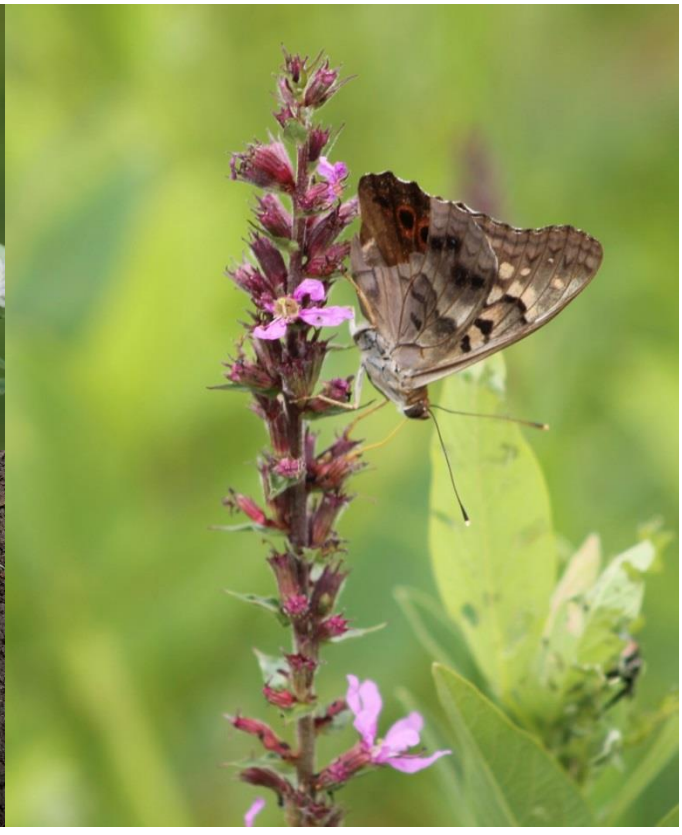
Plethodontid Salamander Monitoring

Monitoring of lungless (Plethodontid) salamanders occurs at ***rare*** by turning over pre-placed wooden cover boards in Indian Woods and the Hogsback once a week for nine-weeks each fall. Total salamander abundances in 2018 were similar to 2017 observations; however, abundances greatly varied between the two forests across the years. Observed abundance in Indian Woods was just above established baseline thresholds, and the reverse was true for the Hogsback with abundances falling below threshold levels. One noteworthy observation was the absence of juvenile salamanders observed in the Hogsback this year. Species diversity continued to be low, with both forests being comprised mainly of eastern red-backed salamanders. Two four-toed salamanders were observed in the Hogsback and one Ambystoma species (blue-spotted/Jefferson) was observed in Indian Woods during monitoring.

Data acquired during the eleven years of consistent salamander monitoring at rare has proven to be useful as it provides empirical evidence on temporal changes in salamander abundances and the impacting factors. Long-term plethodontid monitoring in concert with vegetation sampling, forest health, soil, and bird monitoring can give us a glimpse into the state of our forests at rare and any spatial and temporal changes that occur over time. Only by continuing long-term monitoring, can rare best assess the impact of land management decisions both on and adjacent to the property.

Soil Humus Decay Rate Monitoring

Changes in decay rates may indicate changes in temperature, moisture, substrate type, nutrient concentrations and availability, litter type and size, and soil organisms. Importantly, increased decay rates over decades can be an indication of climate change, as increased soil temperatures increase decay rates and release of stored carbon. Decay rate monitoring occurred in early November around one of the permanent forest canopy plots in each forest stand. Decay rates are determined by burying wooden tongue depressors below the soil surface and comparing their mass lost over a period of a year to those left on the soil surface. A quantitative analysis for soil decay rates is scheduled for 2020, after 10 years of data collection has been completed.



Photos by Owen Lucas and Jenna Quinn
Clockwise from top left: Red-Spotted Purple Butterfly; Tawny Emperor Butterfly; Blue-spotted Salamander